DESIGNING A MULTI-PURPOSE PUBLIC TRANSPORT TERMINAL INTEGRATING RETAIL AND COMMERCIAL SPACES IN SAPANG PALAY, SAN JOSE DEL MONTE, BULACAN

An Experimental Research

Presented to the Faculty of Civil Engineering Division

La Concepcion College

In Partial Fulfillment of the Requirements for the Degree

Bachelor of Science in Civil Engineering

Major in Construction Engineering

and Management

Mandie M. Estinor

Michelle Q. Maxilom

Jeanea Lailanie A. Salva

2025

RECOMMENDATION

This is to certify that this thesis, titled **"DESIGNING A MULTI-PURPOSE PUBLIC TRANSPORT TERMINAL INTEGRATING RETAIL AND COMMERCIAL SPACES IN SAPANG PALAY, SAN JOSE DEL MONTE, BULACAN"** was prepared and submitted by Mandie M. Estinor, Michelle Q. Macxilom, and Jeanea Lailanie A. Salva in partial fulfillment of the requirements for the degree of Bachelor of Science in Civil Engineering, is hereby recommended for Pre-Oral Examination.

ENGR. ELOISA P. CADAG, Reg. CE., MACT
Research Adviser

PANEL OF EXAMINEES

Examined and approved by the Panel of Examiners in an Pre-Oral Defense with a grade of _____on November____, 2025 at La Concepcion College, Bulacan.

Engr. DANILO A. CASAS
Chairman

Engr. CAROLINE A. ASUNCION
Member

Engr. CAMILO A. BATULAN
Member

Accepted and approved in partial fulfillment of the requirements for the degree Bachelor of Science in Civil Engineering.

ENGR. JORE GIL D. GALEZA
Division Head of Civil Engineering

LEILANI I. CUSACK, Ph. D., DBA
Dean of Instruction

CERTIFICATE OF ORIGINALITY

We hereby declare that this research is an original work exclusively conducted by the undersigned researchers. To the best of our knowledge, this study does not contain any material previously published or written by another individual or institution. It has not been submitted to any academic or professional body for the purpose of earning a degree or certification, except where appropriate citations and acknowledgments are provided.

We further affirm that the content of this research reflects our independent effort and intellectual contribution. While we received guidance and support in areas such as data analysis, research methods, and formatting, the overall integrity and authenticity of the study remain entirely our responsibility.

Mandie M. Estinor

Michelle Q. Maxilom

Jeanea Lailanie A. Salva

Researchers

Attested by:

Engr. Eloisa P. Cadag, Reg. CE., MACT

Research Adviser

Date: _____

TABLE OF CONTENTS

Page

Title Page ……i

Recomendation Sheet …… ……ii

Certificate of Originality ……iii

Table of Contents ……..……...iv

CHAPTER I:

THE PROBLEM AND ITS BACKGROUND

Introduction……..1

Background of the Study……..2

Theoretical Framework……4

Conceptual Framework……5

Statement of the Problems……...6

Objectives of the Study……8

Hypothesis……9

Significance of the Study…….9

Scope and Limitations of the Study……10

Definition of Terms…….……11

CHAPTER II:

REVIEW OF THE RELATED LITERATURE AND STUDIES

Foreign Literature……..13

Local Literature…….15

Foreign Studies……..17

Local Studies…….19

Synthesis of Related Literature and Studies…….….22

CHAPTER III:

RESEARCH METHODOLOGY

Research Design……23

Design Process…….……24

Sample and Population……..25

Sampling Technique……..25

Research Instrument……..26

Data Gathering …….26

Statistical Method…….26

CHAPTER 1

The Problem and Its Background

This chapter presents the overview of the study including the introduction, background of the study, theoretical framework, statement of the problem, hypothesis, scope and limitations of the study, significance of the study, and definition of terms.

Introduction

Public transportation plays a big role in the daily lives of people, especially in growing cities like San Jose del Monte, Bulacan and nearby places in Metro Manila. In Sapang Palay, many commuters rely on terminals as their starting point to travel for work, school, or other important activities. However, most terminals are often crowded, far away from each other, disorganized, and lacking in facilities that could make commuting easier and more comfortable.

The rapid growth of Sapang Palay in San Jose del Monte, Bulacan, along with its increasing population, has created a strong need for better and more accessible public transportation. Current facilities struggle to keep up with the number of passengers. There are not enough waiting areas, few amenities, and little connection to nearby shops or services that could make the daily commute easier. Because of this, commuters often feel the burden of long lines, traffic, and wasted time and just to arrive in their destination.

This study aims to create and design a multi-purpose transport terminal that fits the daily lives of the people in Sapang Palay. It will include retail and commercial spaces to offer added convenience to commuters and help boost local businesses within the terminal. It will focus on making travel smoother and more comfortable while giving local vendors a chance to grow their businesses. By blending transportation with retail and commercial spaces, this project aims to help reduce traffic problems and boost the local economy. In the end, the goal is to build a terminal that truly serves the community and supports the ongoing development of the City of San Jose del Monte, Bulacan

Background of the Study

Public transport terminals are more than just places where people wait for buses or jeepneys. They are bustling hubs that connect everyday commuters to their jobs, schools, and homes. As communities grow, these terminals need to do more than handle large crowds, they need to provide comfort, convenience, and safety while making the waiting time more pleasant. Around the world, integrated terminals that combine transportation with retail and commercial spaces are becoming popular because they offer travelers amenities like shops, food stalls, and services all in one convenient location.

This study seek to help by designing a new public transport terminal in Sapang Palay that does more than just serve as a place to catch a ride. It will also have stores, small shops, and food stalls where travelers can buy snacks, medicines, or daily needs

while waiting for their rides. This makes waiting less tiring and gives local workers a chance to sell their goods.

The goal is to make traveling easier, safer, and more pleasant for everyone, especially for commuters, drivers, and vendors in Sapang Palay, San Jose Del Monte, Bulacan. Also the proposed terminal will help reduce traffic jams and give the community a nice, useful space that supports their daily living. This will look at how best to design this kind of terminal in a way that fits the needs of the people and the growing neighborhood.

Theoretical Framework

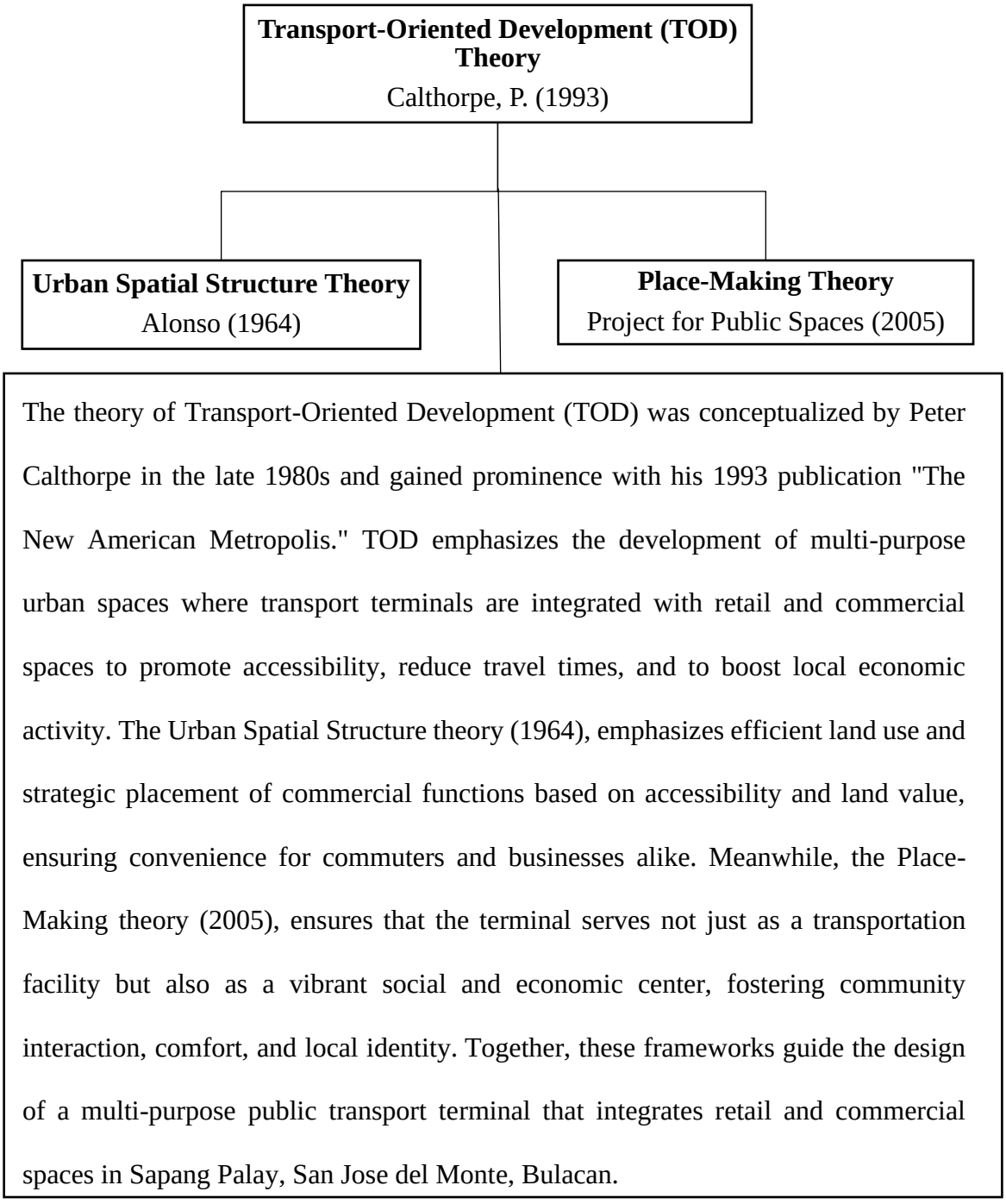
Transport-Oriented Development (TOD) Theory
Calthorpe, P. (1993)
Urban Spatial Structure Theory
Alonso (1964)
Place-Making Theory
Project for Public Spaces (2005)
The theory of Transport-Oriented Development (TOD) was conceptualized by Peter Calthorpe in the late 1980s and gained prominence with his 1993 publication "The New American Metropolis." TOD emphasizes the development of multi-purpose urban spaces where transport terminals are integrated with retail and commercial spaces to promote accessibility, reduce travel times, and to boost local economic activity. The Urban Spatial Structure theory (1964), emphasizes efficient land use and strategic placement of commercial functions based on accessibility and land value, ensuring convenience for commuters and businesses alike. Meanwhile, the Place-Making theory (2005), ensures that the terminal serves not just as a transportation facility but also as a vibrant social and economic center, fostering community interaction, comfort, and local identity. Together, these frameworks guide the design of a multi-purpose public transport terminal that integrates retail and commercial spaces in Sapang Palay, San Jose del Monte, Bulacan.

Figure 1: *Theories from different studies.*

IPO Conceptual Framework

INPUT	PROCESS	OUTPUT
1. What is the demographic profile of the respondents? 1.1. Gender 1.2. Occupation 2. How can the design of the proposed multi-purpose terminal will benefit the drivers, vendors and commuters experience and safety in terms of: 2.1. Accessibility 2.2. Convenience 2.3. Jobs and business opportunities 3. How can retail and commercial spaces be included in the terminal to support local businesses and improve passenger experience as well as the drivers in terms of: 3.1 Setting up spaces for shops, food stalls, and small businesses 3.2 Making commercial areas easy to access for both passengers, drivers and nearby residents	• Prepare a survey questionnaire for validation. • Data gathering conducting survey to commuters, drivers, and vendors via physical survey questionnaire. • Designing of layout using Auto-Cad for 2D and SketchUp for 3D to visualize the proper dimensions and spaces for retail and commercial spaces.	• Will result in a simple summary of who the respondents are, including their gender and occupation, to understand the people who use or will benefit from the terminal. • Will show how commuters, drivers, and vendors feel about the terminal's design—whether it helps make travel easier, more convenient, and supportive of job and business opportunities. • Will produce recommendations and layout ideas for placing shops, food stalls, and small businesses in the terminal to help local sellers and make the terminal more

3.3 Helping create jobs and business opportunities for local people 4. How is the contemplated terminal going to enhance commuter flow and traffic control within Sapang Palay in terms of: 4.1. Organized designated loading and unloading points for public utility vehicles, 4.2. Enhanced travel times and operating efficiency, 4.3. Restoration of operating effectiveness,	• Making a scale model to identify the solution to enhance commuter flow and traffic and traffic control.	comfortable for passengers. • Will provide a plan showing how the new terminal can improve the movement of people and vehicles, organize loading and unloading areas, and help reduce travel time in Sapang Palay.

Figure 2: *Input – Process – Output (IPO) Diagram*

Statement of the Problem

The present transport infrastructure in Sapang Palay, San Jose del Monte, Bulacan is marred by poor facilities, traffic congestion, unregulated terminals, and absence of proper commuter facilities. Lack of a coordinated, multi-functional public transport terminal largely impacts the efficiency of transport operations, commuter safety, and local economic growth potential. With growing demands for greater mobility, organized commercial areas, and productive urban development, the need to

suggest the concept of a multi-purpose public transport terminal to meet these demands is evident. The present research suggests the design and analysis of a multi-purpose transport terminals that provide a combination of retail and commercial areas to provide a secure, functional, and economically feasible space for commuters, local vendors, and community stakeholders. The research seeks to provide the following answers:

1. What is the demographic profile of the respondents?

    1.1. Gender

    1.2. Occupation

2. How can the design of the proposed multi-purpose terminal will benefit the drivers, vendors and commuters experience and safety in terms of:

    2.1. Accessibility

    2.2. Convenience

    2.3. Jobs and business opportunities.

3. How can retail and commercial spaces be included in the terminal to support local businesses and improve passenger experience as well as the drivers in terms of:

    3.1 Setting up spaces for shops, food stalls, and small businesses

    3.2 Making commercial areas easy to access for both passengers, drivers and nearby residents

    3.3 Helping create jobs and business opportunities for local people

4. How is the contemplated terminal going to enhance commuter flow and traffic control within Sapang Palay in terms of:

4.1. Organized designated loading and unloading points for public utility vehicles,

4.2. Enhanced travel times and operating efficiency,

4.3. Restoration of operating effectiveness.

Objectives of the Study

This study examines the implications of building a multi-functional public transport terminal in Sapang Palay, San Jose del Monte, Bulacan, with a particular interest in its design, its retail and commercial spaces, and what opportunities it might bring for improved commuter efficiency and local economy, as well as sustainable metropolitan growth. Specifically, the objectives of this research are as follows:

1. To identify the demographic profile of every respondents.

    1.1. Gender

    1.2. Occupation

2. To design a multi-purposed terminal that will benefit the drivers, vendors and commuters experience and safety in terms of:

    2.1. Accessibility

    2.2. Convenience

    2.3. Jobs and business opportunities.

3. To include retail and commercial spaces in the terminal to support local businesses and improve passenger experience as well as the drivers in terms of:

    3.1 Setting up spaces for shops, food stalls, and small businesses

3.2 Making commercial areas easy to access for both passengers, drivers and nearby residents

3.3 Helping create jobs and business opportunities for local people

4. To enhance commuter flow and traffic control within Sapang Palay in terms of:

4.1. Organized designated loading and unloading points for public utility vehicles,

4.2. Enhanced travel times and operating efficiency,

4.3. Restoration of operating effectiveness.

Hypothesis of the Study

Null Hypothesis (Ho): The proposed Multi-Purpose Terminal along highway in Sapang Palay, San Jose del Monte Bulacan does not significantly improves its safety, accessibility, structural stability, and overall usage of the reconstructed plan.

Alternative Hypothesis (Ha): The proposed Multi-Purpose Terminal along highway in Sapang Palay, San Jose del Monte Bulacan significantly improves its safety, accessibility, structural stability, and overall usage of the reconstructed plan.

Significance of the Study

The findings and implications of this study are expected to yield significant benefits for the following individuals or groups:

Commuters: This study will provide convenience to commuters. It will enable them to access easily different jeepney routes in one single terminal.

Jeepney Drivers/Terminal Operators: The new appearance of the terminal will allow drivers to operate safely and more efficiently by its organized roadway.

Local Entrepreneurs: This study allow local entrepreneurs to grow their bussinesses in favor of the needs of both commuters and operators in the terminal.

Future Researchers: This study will benefit future researchers making it their reference for terminal reconstruction. It will provide knowledge on structural design and development of a terminal hub.

Scope and Limitation

This study will focus on reconstruction of Sapang Palay Jeepney Terminal promoting more efficient structure for commuters, operators, and local entrepreneurs/vendors. It will assess the actual planning and designing of terminals structural features considering safety, accessibility, structural stability, and overall usage of the reconstructed plan. This study will also provide the total cost estimation of the project for financial requirement.

Although estimation is included, the actual project implementation will not covered by this study. It will be limited only to the terminal reconstruction alone. Also, this study only covers the existing terminal infastructure and will not consider the explansion or widening of the area. Other considerations such as long-term maintenance are beyond the scope of this study. The findings of this study will be limited only as academic purposes.

Definition of Terms

Accessibility - The ease with which people can reach and use the public transport terminal and its facilities. This includes safe, direct connections to surrounding commercial areas and accessible design features that accommodate all users.

Commercial Spaces - Designated areas within the terminal for businesses such as retail shops, food stalls, and service providers to serve commuters and generate income.

Commuter Flow - The movement and circulation of passengers within and around the terminal to ensure efficient and orderly transport operations.

Commuters - Individuals who regularly travel using public transportation, especially those passing through or using the terminal.

Convenience - The quality of making the travel experience easier and more comfortable for commuters by integrating amenities like shops and services in one accessible location, reducing waiting time difficulties and enhancing user satisfaction.

Design - The planned layout and structure of the terminal that ensures functionality, efficiency, safety, and user convenience.

Employment - The provision of job opportunities generated by the construction and operation of the transport terminal.

Environmental measures - The terminal need proper ventilation for its efficiency, mufflers with bad smell and black smokes are present in this area causing air pollution and is bad for health.

Green Standards - This involves proper waste managemant, water conservation, and environmental sustainability for constructing the jeepney terminal.

Loading and Unloading - The process of picking up and dropping off passengers at designated areas within the terminal.

Multi-purpose - Refers to the design approach of combining various functions—such as transportation, retail, and commercial spaces—within a single terminal to serve multiple needs and activities of the community simultaneously.

Retail - Refers to stores, small shops, and food stalls within the transport terminal where travelers can purchase snacks, medicines, and daily necessities.

Terminal - A centralized facility where public transport vehicles load and unload passengers. It serves as an organized hub to improve commuter flow, traffic management, and transport efficiency.

Traffic - Describes the flow and movement of vehicles, such as buses and jeepneys, within and around the transport terminal area.

Vehicle - Any mode of transport, such as jeepneys, buses, or tricycles, used to carry passengers to and from the terminal.

Vendor - An individual or business that sells goods or services within the terminal, typically in designated commercial spaces.

CHAPTER 2

Review of Related Literature and Studies

This chapter reviews related literature and studies on the subject of this research. The researchers would try to give a broad idea about the study and define its concept.

Foreign Literature

According to Julaeha, Riyandi, and Umbaran (2025), smart and sustainable transportation systems are essential in addressing urban challenges. Lisbon's public transport system shows inefficiencies when compared to cities like Copenhagen, where fewer people rely on personal vehicles. This raises questions about service effectiveness and passenger satisfaction. Adopting smart mobility policies may help fill service gaps and improve transport quality. The goal is to enhance user experience while ensuring operational and economic sustainability.

Based on Faulhaber et al. (2022), an assistance system is being developed in Kassel, Germany, to improve public transport by addressing common barriers to use. The system focuses on solving three main issues: overcrowded vehicles, missed connections, and difficulty in transporting goods. It introduces three key services including occupancy rate display, transfer connection monitoring, and a delivery

service for purchases to enhance the passenger experience. The concept is supported by user interface integration and is set for implementation through user analysis, lab studies, and a one-year field study.

According to Bollinger (2020), Transit hubs are no longer simply a place where the traveler arrives or departs. The facilities in and around the hub make the area a destination itself and can provide a ripple effect that encourages investment in the area, generates new revenue streams and boosts wider prosperity. Developing a modern transit model requires extensive future planning and development. But it also means ensuring that the full social, environmental and economic potential of existing transit hubs is exploited. By looking at the leading practices among transportation professionals and city planners, as well as missed opportunities uncovered during transit-hub developments around the world, we can gain valuable insights into approaches that will allow us to optimize multi-mode transit hub designs.

According to Fakharany (2025), As cities and infrastructures evolve to meet shifting cultural, environmental, and social demands, new architectural projects are redefining how public spaces and civic institutions operate. This edition of Architecture Now brings together proposals spanning different contexts and scales.

Ganning (2020), emphasized that the success of retail around transit-oriented developments (TODs) is closely tied to how well density, diversity, and design principles are implemented, suggesting that effective terminal design can significantly boost commercial outcomes.

Local Literature

Burgos (2024), a model analysis assessed the worthiness of public transport services in Guimaras Island based on tourist perceptions. Using linear regression, results showed that younger tourists and light users rated transport services higher in terms of convenience, reliability, and safety. Professionals also gave higher ratings compared to students and housewives, particularly on value for money and service quality. These findings highlight the importance of considering demographic and usage patterns in improving transport systems, especially in tourist-dependent areas like Guimaras.

According to Ponce et al. (2025), a smart bus transportation system was developed to improve passenger comfort, enhance campus accessibility, and strengthen traffic control in UP los baños through optimized routes and scheduling schemes. Using origin-destination data, passenger demand points were clustered into bus stops and analyzed using heuristic models, with the demand-based route configuration emerging as the most effective. The results highlight the potential of smart buses in addressing mobility issues within campuses, with recommendations for future studies on demand variability, cost-benefit analysis, and stakeholder perspectives.

According to Beltran and Consolacion et al. (2024), obstacles for challenging labor include unpleasant settings, road construction, low salaries, extended working hours, and traffic congestion. Because of their lengthy working hours and insufficient

salary, jeepney drivers must put daily revenue ahead of their safety. This may result in careless driving that endangers the passengers' safety. A driver's ability to drive may be further restricted by unpleasant working conditions, which may result in drivers' fatigue. To improve the driving practices of jeepney drivers in the Philippines, it is critical to address the issues they experience. This may indicate less traffic, improved working conditions, and increased training. If these changes were made, possibly everyone could use Jeeps to travel efficiently and safely.

Stated by Roquel, Abad, and Fillone (2021), in their study Proximity Indexing of Public Transport Terminals in Metro Manila, analyzed the spatial distribution of existing and proposed transport terminals relative to demand and transit supply. Their findings emphasize that accessibility and intermodal connectivity are crucial foundations for the success of any terminal, including those envisioned as mixed-use hubs. This underscores the importance of location and passenger flow in ensuring that integrated retail and commercial spaces within terminals can attract consistent foot traffic and generate sustainable activity.

Ayala Land, Inc. (2022), One Ayala Intermodal Transport Terminal and Mixed-Use Complex in Makati City, launched by Ayala Land in partnership with the Department of Transportation. As reported in recent business and development articles, One Ayala integrates a major intermodal transport terminal with multiple levels of retail stores, restaurants, and commercial offices. Its design demonstrates how passenger convenience through organized terminals, pedestrian connectivity to the MRT, and comfortable concourses can be aligned with vibrant retail opportunities.

This case illustrates the viability of transport terminals in the Philippines as multi-purpose developments that simultaneously address mobility needs and stimulate economic activity.

Foreign Studies

According to Nielsen et al. (2022), a route choice model was developed for the Greater Copenhagen Region's multimodal public transport system to evaluate how transfer-related attributes influence passenger decisions. The model was based on 4,810 observed travel routes and considered factors such as ease of wayfinding, availability of escalators, and presence of shops at transfer stations. Results revealed that these attributes significantly affect route attractiveness, with transfer penalties ranging from 5.4 to 12.1 minutes depending on transfer quality. The study also found varying preferences among passengers, suggesting opportunities to improve public transport usage by enhancing transfer conditions.

As stated by Rossolov and Naumov et al. (2021), The public transit accessibility has become an important attribute of social and economic activity of contemporary society. The shift to the sustainable paradigm of the current cities' development has made public transport the basic mean for population travels execution. The spatial character of the travels in the megapolises supposes its implementation with the transfers. This may result in the travel time increase if the transport hubs are designed or located inefficiently.

According to Noegroho and Tedja et al. (2021), there are various factors that cause this terminal condition to deteriorate, not only because the transportation pattern has changed but also the lack of funds to maintain buildings operation. This problem is certainly also triggered by the limited funds to operate the terminal facilities devoted by the terminal operational that is government in order to manage and especially to maintain the terminal. Behind the sluggish function of this terminal, there is actually a potential given that the terminal's location is very strategic. This situation is very contradictory, the terminal is in a strategic location but seems to be neglected in terms of both function and performance.

According to Lunardon and Berrini et al.(2023) railway stations in Italy have evolved beyond their role as transport nodes to become multifunctional hubs that integrate mobility, retail, and civic spaces. Their findings highlight the importance of stakeholder collaboration and governance in successfully transforming stations into vibrant urban centers. This study underscores that transport terminals can serve not only as transit facilities but also as commercial and social anchors that contribute to urban vitality.

Meanwhile, Wu, Wang, and Zhao (2025) applied a data-driven approach to evaluate the attractiveness of urban railway stations by analyzing surrounding points of interest (POIs). Their research demonstrated that retail density and commercial diversity around stations significantly influence passenger footfall and the overall success of terminal areas. This suggests that the careful integration of commercial and

retail spaces in transport hubs is not only viable but also essential in enhancing both commuter experience and commercial performance.

Local Studies

Bautista et al. (2024) emphasizes the importance of understanding transportation behavior in developing efficient and sustainable mobility systems, particularly along high-traffic corridors like Roxas Boulevard. If commuter mode choice is influenced by factors such as cost, accessibility, travel time, comfort, safety, reliability, and cleanliness, then identifying these attributes becomes crucial for improving transport services. The research focused on analyzing the most significant factors affecting commuter mode choice using Logit Choice Analysis and Binary Linear Regression through NLOGIT software.

According to Roquel et al. (2021), intermodal connections in Metro Manila remain fragmented despite the presence of an extensive transit network. Their study proposed a method to evaluate the suitability of multimodal terminal locations based on proximity to existing transit supply and demand. Results showed that current terminal locations are more closely related to transit supply. Some proposed sites showed better integration with trip origins and destinations, while others aligned more with existing railways.

According to Ong, and Prasetyo et al. (2023), a service provider’s overall appearance, including its cleanliness, comfort, and ambiance, is important in assessing

service quality. Furthermore, they discovered that first-time customers often base their perceptions on the establishment's physical appearance. The physical state of a service has a significant effect on the customer's perception of service quality and maintains maximum productivity [37]. Zhang et al. [7] showed how other factors such as comfort and overall quality would have an effect on passenger satisfaction.

According to Macalalad and Marasigan et al. (2023) a well- integrated transportation system benefits the individuals, communities, and the broader urban environment. It serves as a cornerstone for economic development, social inclusivity, and environmental stewardship in urban planning. Transportation hubs serve as central points where different modes of transportation converge. This integration facilitates seamless connectivity between towns and cities, allowing passengers to transfer easily between modes, reducing travel time and increasing overall efficiency. Moreover, transportation hubs often become focal points for economic activities. They attract businesses, retail establishments, and other services, leading to job creation, increased commercial activity, and economic growth in the surrounding area. A well-designed transport hub improves the accessibility for residents, businesses, and tourists. They enhance the ease with which people can travel within and between urban areas, fostering inclusivity and improving overall mobility. Integrating different transportation modes in a grand central terminal encourages the use of sustainable transport options, such as buses, public utility jeepneys, and tricycles. This helps reduce the environmental impact of individual car travel, leading to improved air quality and lower carbon emissions.

According to LT Pagaduan Design Studio. (2020), a design-oriented study by LT Pagaduan Studio (2020) presented the New Public Market and Terminal Complex in San Francisco, Agusan del Sur. This project integrates a public market with a transport terminal, combining commercial stalls, waiting areas, and multi-modal transport access within one complex. The proposal emphasized circulation design, storefront visibility, and accessibility, showing how public transport facilities can simultaneously serve mobility needs and community commerce. This case demonstrates that integrating retail and commercial functions into transport terminals is feasible and can contribute to both economic development and commuter convenience at the local level.

Synthesis of Related Literature and Studies

The reviewed literature and studies show that transport terminals with retail and commercial spaces help improve city travel and passenger experience. Foreign authors explain that using smart technology can make transportation more organized, efficient, and convenient. Julaeha, Riyandi, and Umbaran (2025) and Faulhaber et al. (2022) mention that real-time systems and smart tools can reduce traffic and improve services. Bollinger (2020) and Lunardon and Berrini et al. (2023) add that modern terminals should not only be for travel but also serve as centers for business and community activities.

In the Philippines, studies also show efforts to make public transport better through smart systems and improved planning. Burgos (2024) and Ponce et al. (2025) found that using data and route planning can make trips faster and more reliable. However, there are still problems like driver working conditions (Beltran & Consolacion et al., 2024) and poor connections between transport modes (Roquel, Abad, & Fillone, 2021). The One Ayala project (Ayala Land, 2022) shows that combining transport terminals with malls and offices can make travel more convenient and support business growth.

Terminals with good design, services, and comfort attract more passengers and support local businesses (Nielsen et al., 2022; Wu et al., 2025; LT Pagaduan Design Studio, 2020).

CHAPTER 3

Research Methodology

This chapter provides an outline of the research methodology. This part would describe the methods and procedures that the researchers would employ in pursuing the investigation.

Research Design

This study uses Quantitative Descriptive Research Design. The goal of this design is to describe the condition related to Sapang Palay Jeepney Terminal. It will provide the needed data from commuters, jeepney drivers, and local vendors based on their perception and with regard to the safety, convenience, and accessibility of the terminal. Using numerical data, researchers aims to provide an evidence that the current terminal needs a reconstructed plan for the satisfaction or fullfillment of everyone. This method also allows researchers to identify common opinions and criticism among respondents.

Design Process

Conceptual Design

The conceptual design focuses on creating a new terminal layout that enhances commuter movement and integrates retail and commercial spaces for added functionality. The proposed design provides organized loading areas, accessible walkways, and comfortable waiting spaces. It follows the standards set by the National Structural Code of the Philippines (NSCP) to ensure safety and structural integrity.

Site Analysis

The thorough site observation is vital to evaluate the existing structural conditions, providing essential data for designing a terminal that harmoniously incorporates retail and commercial areas. The process also involves observing the terminal's operations and the movement of people during peak and off-peak hours to understand commuter flow and space utilization. Factors such as accessibility, traffic circulation, safety, and the availability of utilities are also considered to ensure an efficient, functional, and well-integrated terminal design.

Data Collection

This process involves gathering essential information using survey questionnaires in specific area of Sapang palay , and conducting a field investigation to provide reliable data about the site and its sorroundings.

Design Tools

The researcher will use AutoCAD to produce detailed 2D architectural and structural plans for the proposed jeepney terminal. SketchUp will be utilized to create 3D models that illustrate the terminal's overall design, layout, and integration of facilities.

Sample And Population

This study focuses on building a public transport terminal. It aims to meet the needs of commuters, drivers, vendors, and nearby residents by instituting a functional and accessible design.

Sampling Technique

The researchers will use Purposive Sampling to select respondents who will meet the specific criteria related to the study's objectives. The respondents will be the commuters, jeepney drivers, and vendors around the terminal of Sapang Palay. The results will provide a data that will help the researchers to design the proposed multi-purpose terminal design.

Research Instrument

The main research instrument in this study will be the structured questionnaire. It will provide researchers a quantitative data among commuters, jeepney drivers, and local vendors who regularly uses the Sapang Palay Jeepney Terminal.

The secondary research instrument will be the design. Researcher will use the software AutoCAD for 2D and SketchUP for 3D visualization. This helps researcher provide an actual scale model for the Jeepney Terminal.

Data Gathering

This study will proposed the use of Surveying, Design Software, 3-Dimensional Model, and Cost Estimation. The data from respondents serves as the basis of the study to enchance and implement the Sapang Palay Jeepney Terminal efficiently.

Statistical Method

The following statistical tools was utilized in this study:

1. **Frequency and Percentage Distribution**. This formula is used in determining and analyzing the demographic profile of respondents and to determine the quantitative relationship in total response.

P = f/n x 100

Where: **f** – is the frequency

n – is the total number of respondents.

2. Weighted Mean. This formula is to be used to measure the general response of the survey samples.

Formula: $\bar{x} = \Sigma fx/n$

Where:

$\bar{x}$ **-** weighted mean

xi - number of answers

wi - weighting factors

Σw - sum of all weighted factors

Σx - sum of all number of answers

3. Likert's Scale. This was used to form of rating scale to assess someone by calculating the degree to which they agree or disagree.

Numerical Value	Verbal Interpretation	Range
5	Strongly Agree	5.00-4.51
4	Agree	4.50-3.51
3	Neutral	3.50-2.51
2	Disagree	2.50-1.51
1	Strongly Disagree	1.50-1.00

Table 1. Likert's Five Point Scale

4. **Chi-Square Test**. a non-parametric test not based on any assumption or distribution of any variable developed by Karl Pearson in 1900. This statistical test follows a specific distribution known as the chi-square test. It measures the relationship between what is observed and what is expected according to an assumed hypothesis called the chi-square test. This test lets us see how well the assumed theoretical distribution fits the observed data.